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PEAT LAND CONSERVATION AND PEAT DUST ABATEMENT

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In previous years dust storms were monitored in the San Joaquin Delta region for the purpose of evaluating the effectiveness of massive dust control measures (inter-row planting of grains in asparagus) and for establishing "norms" against which to measure future changes in delta agriculture. The total of 28 weatherly dust storms (1% of them in the "very bad" category and only three "bad" storms) again, for the third year in which massive controls have been applied, shows a decrease in both number and intensity of dust storms affecting populated areas. According to the strong evidence that the decrease in dust storms is caused by the control measures is the change in distribution of dust storms during the year. There has been a decrease in the percentage of "bad" storms occurring in May and June, the months during which inter-row planting of asparagus is most effective.

Potential soil and dust problems arising from the operation of an experimental white asparagus harvester in peat soil were studied. The soil was found to dry out to the depth of cutting, about 3", and to lose most of its structure. This soil change resulted in two problems. (1) The soil became progressively more fluid and by the end of the experiment (about ½ a normal cutting season) it became difficult if not impossible to prepare a "ridge" which would maintain the necessary shape. (2) Careful observation during windy and dust storm conditions clearly showed that mechanically harvested white asparagus was duller during harvest and much more subject to wind erosion, even when interplanted with barley, than hand harvested asparagus. There is considerable doubt whether inter-row planting will control dust in mechanically harvested white asparagus (as done in 1964) sufficiently to be accepted by the general public. Studies to be made at these problems are described later in this report.

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One of the major problems for asparagus growers using intensive plowing as a control measure is the control of barley volunteer in asparagus fields during late fall and winter. Current cultivation methods have been varied and tested this project that gives adequate control. In some years, however, weather conditions were the outside difficult to apply and less effective. Experiments with herbicides have shown that diacon, sprayed onto the growing barley runs under certain conditions, can do a good job resulting in subsequent volunteer to be acceptable level. Large scale experiments in commercial application and recommendation of diacon for this purpose have been impossible because of lack of residue information. This year a series of asparagus residue experiments to incorporate white asparagus was undertaken. Spraying and harvest schedules running up to the most adverse situation under federal registration as well as normal barley volunteer control conditions were tested. Under only one exaggerated set of conditions did the residue approach questionably close to the Federal tolerance. This set of conditions is easily avoided and would never obtain when spraying for volunteer barley control.

It is the nature of the organic soils of the delta to become progressively more saline. Fields must be periodically leached to prevent excessive salt buildup. There are theoretical reasons why the most used method, the flooding

1. Continued monitoring of dust storms.
2. A further study of the soil problems associated with mechanical asparagus harvesting. Particularly a test of the feasibility of periodic sprinkling to minimize destruction of soil structure. Rates and timing of sprinkling, compatibility with mechanical harvesting, soil structure changes, wind erodibility will be studied.
3. An increased emphasis on research on subsidence, particularly the establishment of additional permanent benchmarks and more detailed surface elevation measurements relating rates of subsidence to cultural practices.
4. A further study of flood leaching if a suitable cooperater can be found.
5. Continued study of the soil temperature profile of organic soil with emphasis on winter and spring changes. A portable soil temperature profile probe is being constructed to measure temperatures under various cultural practices and to find how such measurements relate to "early" asparagus.

7. References

None

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5. PRINCIPAL RESULTS OF RESEARCH (continued)

of large areas without any internal operating drains, should not be as effective as other methods. Analysis of soil samples taken from successive leachings in a field before and after flooding substantiate the theory in part, the ratio of salt removal being lower than that established for greater method. However, there was greater salt removal in one to three foot depths than was anticipated. Study of the salt profiles leads to the conclusion that a slight modification of the flooding method (alternately flooding and draining the land without letting the water stand for long periods as in the present practice) might increase the leaching effectiveness.

Harvesting greater in the organic soil of the delta except to manipulate the soil in late winter so as to cause the asparagus to start early and meet the early high price market. Soil temperature is believed to be the main factor and experience under this project have shown that asparagus can be brought in earlier by relating soil temperatures with plastic mulches. Plastic mulches were expensive and harvesting was difficult if plastic were to remain intact and soil temperatures maintained. During the winter, the deep soil temperature is warmer than the surface soil and the atmosphere so heat flows upward to the surface. This situation is reversed later in the year. If more were known about when this reversal takes place and how the soil temperature profile changes during this time, it might be possible to manipulate early spring temperatures by appropriate tillage methods. (Fluff up surface to insulate, expect to increase heat conductivity, remove soil to create shallower soil profile) Soil temperatures from 2" down to 4" were measured or recorded throughout the year. No clear cut date of heat flow reversal is indicated by this data for the 1963-64 winter but at 1 depth were not instrumented during the first part. The reversal appears to have taken place in early January. The one foot depth was the coldest part of this profile through most of the winter. This was unexpected and will be carefully checked during the 1964-65 winter. No firm conclusions can be drawn without at least one more season's data.

The measurement of the elevations of Lower Jones, Muleshoe and Beacon Islands along a transect set up in 1952 by Walter H. Holt, Irrigation Engineer (now deceased), California Agricultural Experiment Station, was continued under this project. The rate of subsidence and present elevation of the islands of the delta is of concern to the owners and is important in government expense planning work and changes in the delta area. In 1954 the average elevations ~~above sea level~~ were as follows: Lower Jones Tree, 12.72 ft.; Beacon Island, 14.48 ft.; Muleshoe Island, 12.26 ft. The average rate of subsidence of all three islands for the period 1953-1954 is substantially less than the average rate for the period of 1930-1951. It is too early

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2. PRELIMINARY RESULTS OF RESEARCH (continued)

yet to tell if this is a common situation because of the erratic nature of subsidence of these islands over short periods. Techniques of measurement and calculation were improved this year resulting in more dependable surveys. The rates of subsidence on an island were found to be far from uniform along the line of traverse. On Lower Jones, the rate of subsidence since the last survey in 1961 was about 0.4 ft. per year in the northern half but only 0.08 ft. per year in the southern half. In Hildred the rates were 0.10 ft. per year on the northern portion and 0.17 ft. per year on the southern portion. The significance of these differences in rates are not fully understood. On Jones, the low rate was associated with continuous vegetation while the high rate was on ground recovered from vegetation and planted to willow for the period. On Hildred, the lower rate appears to be associated with a higher water table, an important understanding of the factors affecting subsidence could lead to changes in organic soil management aimed at minimizing subsidence.

In addition to measuring gross changes in elevation of certain islands, the study of subsidence at different levels of the soil profile began late in 1962 and were continued. While both the undisturbed and reconstituted profiles showed a rate of surface subsidence of the order of 3/4" to 1" during the year, the relative movements of the various portions of the profile were probably different, particularly in expansion due to a rise in water table. It is clear that for meaningful information to be obtained by this technique, undisturbed natural profiles must be used. While the rate of surface subsidence over most of the year was 1" per year, net yearly table was rather. Either of these two rates is considerably less than the 2" to 2 1/2" per year subsidence on the three islands mentioned above. This may be due either to a decreasing soil density which has not yet reached equilibrium or to a subsidence of the 5' level which has been the cause for these measurements. A planned deeply planted permanent framework at the site should resolve this dilemma.

Report by H.B. Sonnita, Agricultural Enginiering Service

The survey of the wind conditions during the spring and summer months was continued in 1963 at Terrebonne and Green Islands. In April and May, several days with wind above the critical velocity, some even with over 20 mph., were registered. However, the month of June, which usually has a considerable number of just preceding velocities too -- though less than April and May -- was quiet in 1963 except for the first 6 days. The remainder of the dry season was "quiet" also, except for one day with strong northwinds in September, a phenomenon occurring in some years.

Next year, a more comprehensive analysis of wind velocity data is planned using the newly available observations at the St. Lucie airport.